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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,761	03/06/2002	Nobuyuki Mise	500.41317X00	7161
20457	7590	03/24/2004	EXAMINER	
ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-9889			VINH, LAN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/090,761	Applicant(s) MISE ET AL.	
	Examiner Lan Vinh	Art Unit 1765	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 March 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>031804</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 2, 4, 12, 14, 21 are objected to because of the following informalities:

In line 3 of claim 2 and claim 12, the examiner suggests replacing "a group" with --the group--to correct the improper use of Markush language

In line 6 of claim 4, the term "sad" appears to be a typographical error. The examiner suggests replacing the term "sad" with --said--

In line 7 of claim 14, the term "angel" appears to be a typographical error. The examiner suggests replacing the term "angel" with --angle--

Claim 21 recites the limitation "said mask". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-2 are rejected under 35 U.S.C. 102(e) as being anticipated by Ying et al (US 6,541,380)

Ying discloses a plasma etching process for metal using a mask formed on a metal layer. This process comprises the step of : etching a metal layer 116 of platinum (claimed hardly-etched material) formed on a substrate using a mask 118, the mask 118 having a sidewall angled at less than 90 degree with respect to the surface of the substrate 112 (col 4, lines 18-20, col 5, lines 5-6)

The limitation of claim 2 has been discussed above.

4. Claim 21 is rejected under 35 U.S.C. 102(b) as being anticipated by Nagano et al (US 6,100,100)

Nagano discloses a method for manufacturing capacitor. This method comprises the step of : etching a metal layer 2 of platinum using a hardmask layer 3, the hardmask layer having a sidewall angled at less than 80 degree with respect to the surface of the substrate (col 4, lines 1-5, fig. 2B)

5. Claims 3-9, 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Ying et al (US 6,541,380)

Ying discloses a plasma etching process for metal using a mask formed on a metal layer. This process comprises the step of : etching a metal layer 116 of platinum (claimed hardly-etched material) formed on a substrate using a mask 118, the mask 118 having a sidewall angled at less than 90 degree with respect to the surface of the

Art Unit: 1765

substrate 112 (col 4, lines 18-20, col 5, lines 5-6), the etched metal layer 116 having a taper angle that is larger than the taper angle of the mask 118 (fig. 1B)

Regarding claim 5, fig. 1A of Ying shows that the mask 118 is etched

Regarding claims 6-7, Ying discloses changing the gas composition introduced into the chamber to adjust the taper angle of the mask (col 7, lines 40-60)

Regarding claim 8, Ying discloses changing the thickness of layer 116 and the etching time (col 4, lines 33-35, col 7, lines 55-57)

Regarding claim 9, Ying discloses that the thickness of the patterned mask 118 can range from 500-9000 angstroms (col 4, lines 58-60), which reads on the step of changing the size of the photoresist mask formed on the mask.

The limitation of claim 12 has been discussed above.

6. Claims 16-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Ying et al (US 6,541,380)

Ying discloses a plasma etching process for metal using a mask formed on a metal layer. This process comprises the step of : etching a metal layer 116 of platinum formed on a substrate using a mask 118, the mask 118 having a sidewall angled at less than 90 degree with respect to the surface of the substrate 112 (col 4, lines 18-20, col 5, lines 5-6), the etched metal layer 116 having a taper angle that is substantially at 90 degree (fig. 1B), the etching process results in some deposition of by product upon the inside reactor surface/wall of an etching apparatus (col 7, lines 65-66)

Regarding claim 17, Ying discloses that the by product are easily removed (col 8, lines 1-2)

The limitation of claim 18 has been discussed above.

7. Claims 19-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Garriga (US 6,451,118)

Garriga discloses a method for processing substrates by exposure to a process reactive gas in an apparatus comprises a wafer carrier 504 that is connected to a plurality of processing chambers 520, 522, a plurality of post processing chambers 550, 552, a plurality of vacuum chambers/lock chamber 524, 526, an atmospheric robot arm located next to the chambers 524 and connected to the chambers 524, a wafer cassette 514 (col 7, lines 1-31, fig. 5). This method comprises the steps of:

plasma ashing, etching the substrate can be done in one of the processing chambers 520, 522, (col 7, lines 13-15), rinsing and drying the substrate in one of chambers 550, 552 (col 7, lines 46-50), which reads on post-processing the substrate one of post-processing chambers

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying et al (US 6,541,380) in view of Nagano et al (US 6,100,100)

Ying's method has been described above. Unlike the instant claimed invention as per claim 10, Ying fails to disclose the step of washing the mask in the middle of etching the mask and subsequently etching again the mask.

Nagano discloses a method for manufacturing capacitor comprises the step of washing the mask while etching the mask and subsequently etching again the mask (col 4, lines 1-5, fig. 2A-2C)

Since Ying discloses that the etching process results in the deposition of by product along the sidewall of etched feature (col 7, lines 16-18), one skilled in the art would have found it obvious to modify Ying by adding the step of washing the mask while etching the mask as per Nagano because Nagano teaches that the reaction product adhered to the sides of the mask for etching can be easily removed by washing the mask and the etched film (col 4, lines 8-10)

Regarding claim 11, Ying discloses that the thickness of the patterned mask 118 can range from 500-9000 angstroms (col 4, lines 58-60), which reads on the step of changing the size of the photoresist mask formed on the mask

10. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagano et al (US 6,100,100) in view of Arao et al (US 6,596,571)

Nagano discloses a method for manufacturing capacitor element comprises the steps of: forming an electrode layer 2 of platinum/hard-etched material on a substrate,

Art Unit: 1765

forming a mask 3 on layer 2, etching the electrode layer 2 using the mask 3 (col 4, lines 60-63), washing the etched layer while etching (col 4, lines 5-7)

Unlike the instant claimed invention as per claim 13, Nagano fails to disclose the step of again etching the layer of hardly-etched material.

Arao discloses a method for forming a semiconductor device having tapered electrode comprises the step of etching an electrode layer after the step of washing the layer (col 15, lines 35-38, col 16, lines 13-15)

Hence, one skilled in the art would have found it obvious to modify Nagano's method by adding the step of again etching the electrode layer/hardly-etched material as per Arao because according to Arao, the etched conductive layer is further thinned by a second etching (col 11, lines 50-53)

Regarding claim 14, Fig. 2B of Nagano shows a semiconductor device comprises a substrate 1, a layer 2 of platinum/hardly etched material having a sidewall formed on the substrate 1, the sidewall has a tapered angle .

11. Claims 13, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yokoyama et al (US 5,515,984) in view of Nagano et al (US 6,100,100)

Yokoyama discloses a method for etching Pt film comprises the steps of: forming an layer 7 of PZT/hard-etched material on a substrate , forming a mask 9 on layer 7, etching the layer 7 using the mask 9 (col 4, lines 17-20), again etching the layer 7 by HCl aqueous solution using the mask 9 (col 5, lines 36-40, fig. 1F)



Art Unit: 1765

Unlike the instant claimed invention as per claim 13, Yokoyama fails to disclose the step of washing out the etching product in the middle of the etching

Nagano discloses a method for manufacturing capacitor element comprises the step of washing the etched layer while etching (col 4, lines 5-7)

Hence, one skilled in the art would have found it obvious to modify Yokoyama's method by adding the step of washing the etched layer while etching to remove the reaction products from the side of the mask as taught by Nagano (col 4, lines 5-7)

Regarding claim 15, Fig. 1F of Yokoyama shows a semiconductor device comprises a substrate, two layers 7 and 6 of PZT and platinum/hardly etched materials formed on the substrate, layer 6 having a sidewall taper angle different from the sidewall of layer 7.

***Conclusion***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV

March 19, 2004